

TAILORED THERMAL BARRIER COATINGS DEPOSITED BY HYBRID WATER-STABILIZED PLASMA TORCH

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High enthalpy plasma generated by hybrid water-stabilized plasma (WSP-H) torch enables spraying of dry powders, suspensions as well as solutions with superior feed rates, which makes this technology ideal for cost-effective spraying of thick and/or large-area coatings. Moreover, the versatility of the deposition process enables individual tailoring of the coatings compositions, microstructures and properties for various novel applications. In this study, feasibility of high throughput deposition of TBCs with WSP-H technology will be illustrated for selected model materials (e.g., YSZ, $\text{Gd}_2\text{Zr}_2\text{O}_7$, YAG) deposited from conventional powders as well as from liquid feedstocks. Application-relevant properties of these coatings (thermal conductivity, wear resistance, mechanical properties, high-temperature behavior, etc.) will be discussed and related to the wide range of achievable microstructures (see figures below for illustration). Examples of perspective multiphase coatings having layered, intermixed or functionally graded microstructures will be also provided.

Comparison of the TBC deposition carried out with WSP-H and conventional gas-stabilized plasma torches (i.e. torches providing plasma with vastly different properties) will provide a new perspective on the processes governing plasma-matter interactions and coating build-up phenomena.

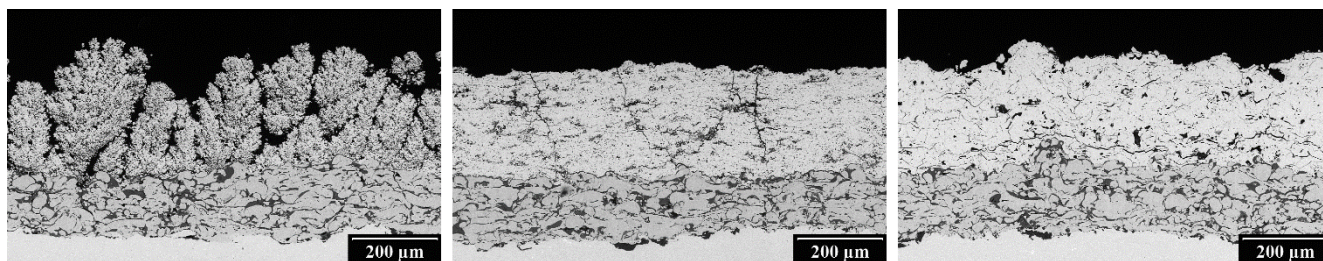


Figure 1 – Examples of TBCs deposited by WSP-H technology. NiCrAlY bond coat (deposited from coarse powder) covered by YSZ top coats (deposited from suspension – left, solution – center, powder – right).

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